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| 10/596,750 | 05/15/2007 | Van Suong Hoa | 789-100 | 1088 |
| 86002 | 7590 | 07/23/2010 | EXAMINER | |
| J. Rodman Steele | | | FEELY, MICHAEL J | |
| Novak Druce & Quigg LLP | | | ART UNIT | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/596,750 | HOA ET AL. | |
| | Examiner | Art Unit | |
| | Michael J. Feely | 1796 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 04 May 2010.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1,3-16,18-24,26 and 27 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 14-16,18-24,26 and 27 is/are rejected.
 7) Claim(s) 1,3-16,18-24,26 and 27 is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 22 June 2006 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

| | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____. | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

Pending Claims

Claims 1, 3-16, 18-24, 26, and 27 are pending.

Priority

1. The instant application is a national stage entry of PCT/CA04/02184, filed December 22, 2004, which claims priority to US provisional application no. 60/531,618, filed December 23, 2003.

- Claims 1, 3-16, 18-24, 26, and 27 are fully supported by the provisional application; accordingly, they have an effective filing date of December 23, 2003.

Response to Amendment

2. The objection to the specification has been overcome by the amendment to the claims.

3. The rejection of claim 25 under 35 U.S.C. 101 and 35 U.S.C. 112, 2nd paragraph, has been rendered moot by the cancellation of this claim.

4. The rejection of claim 25 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Drzal et al. (US 2005/0119371) has been rendered moot by the cancellation of this claim.

5. The rejection of claims 20-22 and 24 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Drzal et al. (US 2005/0119371) has been overcome by amendment.

6. The objection to claims 2, 17, and 25 has been rendered moot by the cancellation of these claims.

Previously Indicated Allowable Subject Matter

7. The indicated allowability of claim 17 has been rendered moot by the cancellation of this claim.
8. The indicated allowability of claims 14-16, 18, 19 is withdrawn in view of the newly discovered reference(s) to Guraya (US 2003/002688). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 112, 1st paragraph

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claims 14-16, 18, and 19 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. A *region of obstacles* for breaking down the agglomerates is critical or essential to the practice of the invention, but not included in the claim(s). Such an omission is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

Based on the specification, it appears that the dispersion device requires a second *region of obstacles* for breaking down the agglomerates. This region is downstream of the "first section" and upstream of the "pressure collapse chamber". Without this *region of obstacles*, it is

unclear if sufficient de-agglomeration of the clay can be achieved prior to the "pressure collapse chamber".

11. Claims 20-24 and 26 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. The step of submitting the flow of clay solution to a *region of obstacles* is critical or essential to the practice of the invention, but not included in the claim(s). Such an omission is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976).

Based on the specification, it appears that the flow of clay solution has to be submitted to a *region of obstacles* for breaking down the agglomerates. This region is downstream of the "high pressure/velocity" region and upstream of the "sudden lower pressure" region. Without this *region of obstacles*, it is unclear if sufficient de-agglomeration of the clay can be achieved prior to the "sudden lower pressure".

Claim Rejections - 35 USC § 112, 2nd paragraph

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claims 14-16, 18, and 19 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: a *region of obstacles* for breaking down the agglomerates – *see rejection above in section 10*.

14. Claims 20-24 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps.

See MPEP § 2172.01. The omitted steps are: submitting the flow of clay solution to *a region of obstacles* for breaking down the agglomerates – *see rejection above in section 11.*

15. Claim 27 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 27 recites the limitation "the method" of claim 23. There is insufficient antecedent basis for this limitation in the claim because claim 23 is drawn to a *modified epoxy*. It appears that this claim should be dependent from claim 13.

Claim Objections

16. Claims 1, 3-16, 18-24, 26, and 27 are objected to because of the following informalities: (1) in the method claims, the *agglomerates* should be introduced in step a); (2) in the apparatus claims, the *agglomerates* should be introduced in container a); and (3) in the product-by-process claims, the *agglomerates* should be introduced in step a). Appropriate correction is required.

Suggested Claim Language

17. The following is suggested claim language for the independent claims. Should Applicant use this suggested claim language, appropriate changes should be made to the dependent claims to correspond to the new language of the independent claims.

1. (Proposed Amendment) A method for making a modified epoxy, comprising the steps of:
 - a) mixing solvents and clay particles of a dimension in the nanometer range, to form a clay solution featuring agglomerates of said clay particles;

b) generating a flow of clay solution and submitting said flow to: (1) a high pressure to generate high velocity and to allow shearing in the clay solution to occur; (2) a region of obstacles allowing the agglomerates to be broken down ~~breaking up of agglomerates of clay particles occurring in the clay solution~~; and (3) a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution; and

c) mixing the dispersed clay solution with at least a pristine epoxy.

14. (Proposed Amendment) An apparatus for making modified epoxy from a pristine epoxy, comprising:

- a) a first container for preparing a clay solution featuring agglomerates of clay particles by mixing solvents and clay particles of a dimension in the nanometer range;
- b) a device for dispersing the clay solution of clay particles; and
- c) a second container for mixing the dispersed clay solution of clay particles with the pristine epoxy;

wherein said device for dispersing the clay solution of clay particles comprises: a) 1) a first section for submitting a flow of the clay solution of clay particles to a high pressure to generate high velocity and to allow shearing in the clay solution to occur; 2) a region of obstacles for breaking down the and to allow breaking impacts to break up agglomerates of clay particles occurring in the solution; and 3) a pressure-collapse chamber to provide a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution.

20. (Proposed Amendment) A modified epoxy produced from a pristine epoxy, the modified epoxy having at least higher barrier properties and thermal resistance than the pristine epoxy, the modified epoxy produced by:

- a) mixing solvents and clay particles of a dimension in the nanometer range, to form into a clay solution featuring agglomerates of said clay particles;
- b) generating a flow of the clay solution and submitting submitted said flow to: (1) high pressure to generate high velocity and to allow shearing in the clay solution to occur; (2) a region of obstacles allowing the agglomerates to be broken down; and (3) a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution; and
- c) mixing the dispersed clay solution with at least part of the pristine epoxy.

Claim Interpretation

18. It should be noted that a claimed apparatus must be *structurally* distinct from the prior art. Also, the manner of operating the device does not differentiate apparatus claims from the prior art - *see MPEP 2114*. Accordingly, claims 14-16, 18, and 19 have been interpreted as:

(14-16, 18, 19) An apparatus *capable of making modified epoxy from a pristine epoxy*, comprising:

- a) a first container *capable of preparing a clay solution featuring agglomerates of clay particles by mixing solvents and clay particles of a dimension in the nanometer range*;
- b) a device *capable of dispersing the clay solution*; and

c) a second container *capable of mixing the dispersed clay solution with the pristine epoxy;*

wherein said device *capable of dispersing the clay solution* comprises:

1) a first section *capable of submitting a flow of the clay solution to a high pressure to generate high velocity and to allow shearing in the clay solution to occur;*

2) a region of obstacles *capable of breaking down the agglomerates;* and

3) a pressure-collapse chamber *capable of providing a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution.*

Claim Rejections - 35 USC § 102

19. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

20. Claims 14-16, 18, and 19 are rejected under 35 U.S.C. 102(a) as being anticipated by Guraya (US 2003/0026888).

21. Claims 14-16, 18, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Guraya (US 2003/0026888).

Regarding claims 14-16, 18, and 19, Guraya discloses: (**14-16, 18, 19**) an apparatus capable of making modified epoxy from a pristine epoxy, comprising:

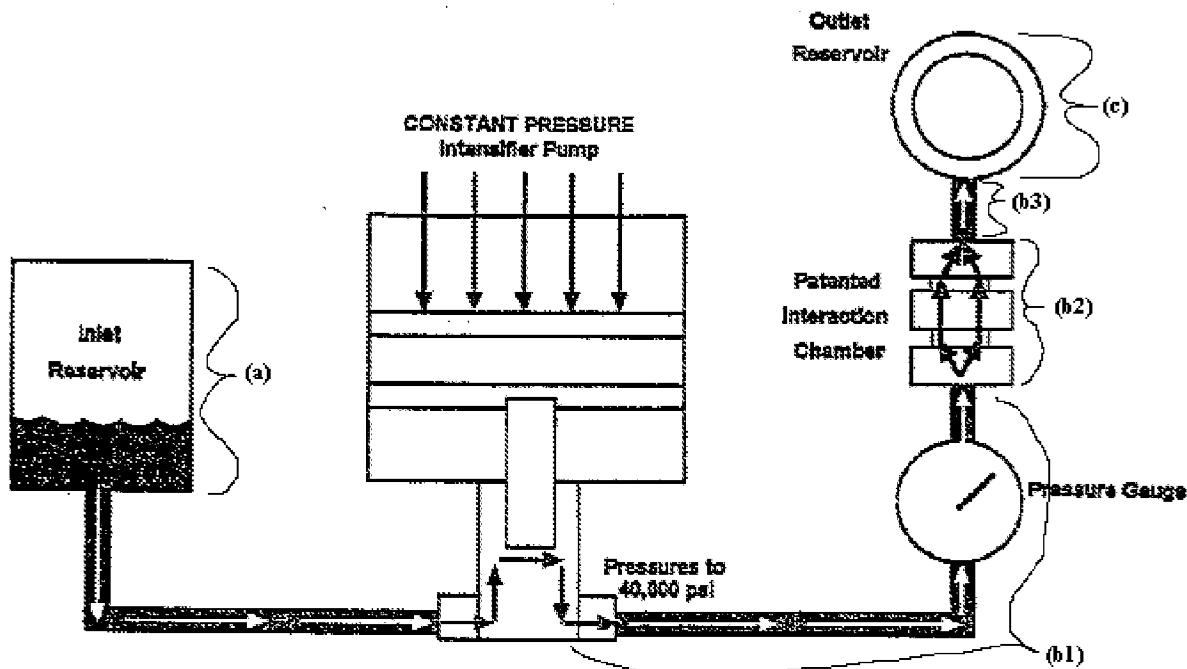
a) a first container *capable of preparing a clay solution featuring agglomerates of clay particles by mixing solvents and clay particles of a dimension in the nanometer range* (Figure 1; paragraphs 0027-0028: *see inlet reservoir*);

b) a device *capable of dispersing the clay solution* (Figure 1; paragraphs 0027-0028: *see pressurized area, interaction chamber, and outlet from interaction chamber*); and

c) a second container *capable of mixing the dispersed clay solution with the pristine epoxy* (Figure 1; paragraphs 0027-0028: *see outlet reservoir*);

wherein said device *capable of dispersing the clay solution* comprises:

- 1) a first section *capable of submitting a flow of the clay solution to a high pressure to generate high velocity and to allow shearing in the clay solution to occur* (Figure 1; paragraphs 0027-0028: *see pressurized area*);
- 2) a region of obstacles *capable of breaking down the agglomerates* (Figure 1; paragraphs 0027-0028: *see interaction chamber*); and
- 3) a pressure-collapse chamber *capable of providing a sudden lower pressure, yielding a dispersed clay solution having a fine and homogeneous distribution of clay particles of a dimension in the nanometer range in the clay solution* (Figure 1; paragraphs 0027-0028: *see outlet from interaction chamber*):



Claim Rejections - 35 USC § 102/103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. Claims 20-22 and 24 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Drzal et al. (US 2005/0119371). Note: Drzal et al. claims priority to US provisional application 60/511,258 (*filed October 15, 2003*), which fully supports the cited portions of the pre-publication. Accordingly, the 102(e) date of Drzal et al. is *October 15, 2003*.

Regarding claims 20-22 and 24, Drzal et al. disclose: **(20 & 22)** a modified epoxy produced from a pristine epoxy comprising: solvent (paragraphs 0011, 0080, 0098), nano-clay particles (paragraphs 0011, 0080, 0098), and pristine epoxy (paragraphs 0011, 0080, 0098), wherein clay particles of nano-dimensions are finely and homogeneously distributed in the modified epoxy (paragraphs 0011, 0080, 0098); **(21)** comprising finely dispersed clay agglomerates of less than about 1 μm and agglomerates of a maximum diameter between about 1 μm and 2 μm (paragraphs 0011, 0080, 0098); and **(24)** further comprising additives (paragraph 0098: *modified clay*).

Drzal et al. form their dispersion by: (a) creating a solution of solvent, nano-clay, and epoxy; and (b) sonicating the solution. Accordingly, Drzal et al. fail to disclose the claimed steps of:

(a) mixing solvents and clay particles of a dimension in the nanometer to form a clay solution;

(b) submitting a flow of the clay solution to: (1) high pressure to generate a high velocity and to allowing shearing in the clay solution to occur; (2) a region of obstacles allowing the agglomerates to be broken down; and (3) a sudden lower pressure; and

(c) mixing the dispersed clay solution with at least part of the pristine epoxy.

However, it should be noted that the instant claims are provided in product-by-process format. In light of this, it has been found that, “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process,” – *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (see MPEP 2113).

Therefore, it appears that the instantly claimed modified epoxy is the same or an obvious variation of the one set forth in Drzal et al. because the final product of Drzal et al. satisfies all of the material/chemical limitations of the instant invention.

Further regarding claims 20 and 22, Drzal et al. fail to explicitly disclose: (20) the modified epoxy having at least higher barrier properties and thermal resistance than the pristine epoxy; and (22) wherein a content of about 1 wt % of clay loading yields an increase in a fracture toughness, with an increase in K_{IC} and G_{IC} of up to 2 and 3 times with respect to the pristine epoxy respectively. However, it appears that the composition of Drzal et al. would have inherently satisfied the property limitations of claim 20 because they satisfy all of the

material/chemical limitations of the instant invention. Furthermore, it appears that the composition of Drzal et al. would have been inherently capable of satisfying the property limitations of claim 22 at the appropriate loadings (*which are not explicitly required by the claim*).

In light of this, it has been found that, “Products of identical chemical composition can not have mutually exclusive properties.” A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present – *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Therefore, it appears that the composition of Drzal et al. would have inherently satisfied the property limitations of claim 20 because they satisfy all of the material/chemical limitations of the instant invention. Furthermore, it appears that the composition of Drzal et al. would have been inherently capable of satisfying the property limitations of claim 22 at the appropriate loadings.

Claim Rejections - 35 USC § 103

24. Claims 23 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Drzal et al. (US 2005/0119371) in view of Furihata (US Pat. No. 4,465,542).

Regarding claim 23, the teachings of Drzal et al. are as set forth above and incorporated herein. Drzal et al. desire toughness and flexibility in their composition; however, they fail to explicitly disclose: (23) wherein said pristine epoxy is a rubber-modified epoxy.

The teachings of Furihata demonstrate that rubber materials, such as CTBN, are recognized in the art as suitable additives for epoxy/clay compositions that require toughness and flexibility (*see Abstract; column 6, lines 37-53*). In light of this, it has been found that the selection of a known material based on its suitability for its intended use supports a *prima facie* obviousness determination – *see MPEP 2144.07*.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to add rubber to the composition of Drzal et al. because the teachings of Furihata demonstrate that rubber materials are recognized in the art as suitable additives for epoxy/clay compositions that require toughness and flexibility.

Regarding claim 26, the combined teachings of Drzal et al. and Furihata are as set forth above and incorporated herein. The combined teachings fail to explicitly disclose: (26) the modified epoxy has an increase in K_{IC} and G_{IC} of up to 2.2 and 7.6 times at 6-phr loading and 20-phr CTBN compared with the pristine epoxy. However, it appears that the combined teachings would have been inherently capable of satisfying these property limitations at the appropriate loadings (*which are not explicitly required by the claim*).

Furthermore, it has been found that, “Products of identical chemical composition can not have mutually exclusive properties.” A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present – *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

Therefore, it appears that the combined teachings of Drzal et al. and Furihata would have been inherently capable of satisfying the property limitations of claim 26 at the appropriate loadings.

Response to Arguments

25. Applicant's arguments filed May 4, 2010 have been fully considered but they are not persuasive.

Applicant argues that Drzal et al. no longer qualifies as prior art. The Office respectfully disagrees because: (a) Drzal et al. claims priority to US provisional application 60/511,258 (*filed October 15, 2003*), which fully supports the cited portions of the pre-publication; and (b) accordingly, the 102(e) date of Drzal et al. is *October 15, 2003*.

Allowable Subject Matter

26. Claims 1 and 3-13 would be allowable if rewritten or amended to overcome the objection(s) set forth in this Office action.

27. Claim 27 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Communication

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J. Feely whose telephone number is (571)272-1086. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Y. Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael J Feely/
Primary Examiner, Art Unit 1796

July 22, 2010